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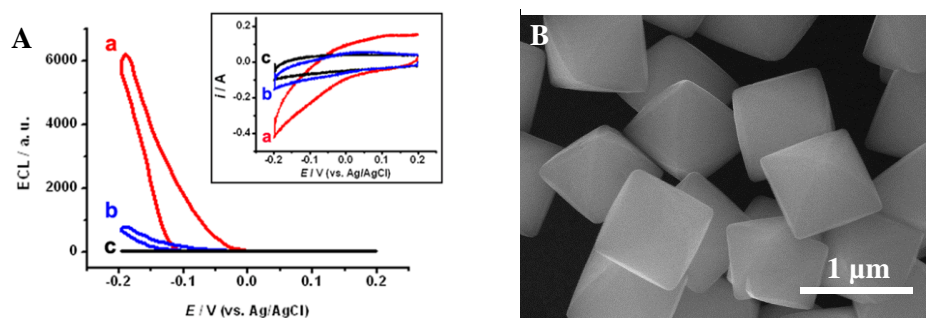
## High Catalysis Activity of Cu<sub>2</sub>O Microcrystals to the Electrochemiluminescence of Luminol and H<sub>2</sub>O<sub>2</sub>

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Cuprous oxide (Cu<sub>2</sub>O) is a classical p-type semiconductor with a direct band gap of 2.17 eV, which is widely used for solar energy conversion, CO oxidation, and photo catalytic water splitting for the low cost and environmental friendliness.<sup>1</sup> For the energy band positions are favorable to the hydrogen evolution and oxygen evolution potentials, Cu<sub>2</sub>O materials also catalyze the reduction of hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>), which is an critical molecule in the bodies' metabolism processes or the industrial catalysis reactions.<sup>2</sup> To improve detection sensitivity of H<sub>2</sub>O<sub>2</sub>, people have composed Cu<sub>2</sub>O materials with Ag nanoparticles or graphene nanosheets, which are sophisticated and cost.<sup>3</sup> Herein, we use the electrochemiluminescence (ECL) method to improve the sensitivity of the reaction catalyzed by Cu<sub>2</sub>O microcrystals. As shown by Figure 1A, the ECL reaction of H<sub>2</sub>O<sub>2</sub> and luminol catalyzed by Cu<sub>2</sub>O octahedra (Figure 1B) is strong at the potential of -0.2 V (vs. Ag/AgCl). And the corresponding current of the reaction is not obvious (Figure 1A, inset). We also check the effect of copper ions (Cu<sup>2+</sup>) to the ECL reaction, and there is much lower catalytic activity to the ECL reaction by Cu<sup>2+</sup> ions. It indicates that Cu<sub>2</sub>O semiconductor microcrystal possess the good catalytic performance to this ECL reaction, which is important to develop the high-efficient and low-cost biosensors.



**Figure 1.** (A) ECL-potential curves of (a) 100 μM luminol and 100 μM H<sub>2</sub>O<sub>2</sub> solution on the Cu<sub>2</sub>O modified glassy carbon electrode (GCE), (b) 100 μM luminol, 100 μM H<sub>2</sub>O<sub>2</sub>, and 100 μM Cu<sup>2+</sup> solution on GCE, and (c) 100 μM luminol and 100 μM H<sub>2</sub>O<sub>2</sub> solution on GCE. Phosphate buffer, 50 mM, pH 7.4. Inset, corresponding cyclic voltammograms, scan rate. 50 mV·s<sup>-1</sup>. (B) Scanning electronic microscopy image of octahedral Cu<sub>2</sub>O microcrystals.

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